CENTRAL VALLEY POSTHARVEST NEWSLETTER

COOPERATIVE EXTENSION ● University of California
Kearney Agricultural Center
9240 S. Riverbend Avenue ● Parlier, CA 93648 USA
(559) 646-6500

Contents:

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Carlos H. Crisosto, Editor

carlos@uckac.edu

This newsletter is posted on our website at www.uckac.edu/postharv You must subscribe to receive a mailed copy.	**Visit our websites** **http://www.uckac.edu** **http://postharvest.ucdavis.edu** **http://www.plantsciences.ucdavis.edu**

ARE WE BRUISING OUR FRUIT?

Carlos H. Crisosto

Our previous work indicated that in most stone fruit cultivars, delaying harvest beyond “California Well Mature” increased fruit size. In some cultivars and/or orchard conditions fruit red color also increased, and in a few cases, there was the perception of an improvement in flavor components such as soluble solid concentration (SSC). These potential delayed harvest benefits on quality attributes can be improved according to orchard conditions. Fruit harvested at high maturity could have high quality initially, but may be incapable of withstanding the rigors of postharvest handling and distribution.

As it is very hard to monitor maturity to safely delay harvest, especially in full red color cultivars, we developed the maximum maturity index concept for stone fruit cultivars based on the fruit firmness (pounds force) bruising potential measured in acceleration units (Gs) and their relationship to bruising formation. The critical bruising thresholds (CBT) were developed using bruising susceptibility measurements based on fruit firmness at the weakest point on the fruit. Bruising potential was calculated for different levels of bruising potential expressed in Gs (acceleration). These critical bruising thresholds (CBT) predict how much physical abuse fruit will tolerate at different firmness levels during packinghouse operations. The CBT can be used as one more tool to determine when to harvest peach, plum, and nectarine cultivars with darker skin color since their early red color development masks the ground color, making it impossible to determine the optimum fruit maturity based on skin color changes from green to yellow. CBT can be used, in addition to other factors including orchard history, to assist in making the decision on how late we can pick without inducing bruising, thereby maximizing fruit size and other quality potential from different orchards. During two seasons, an evaluation of the impact bruising susceptibility of several plum, yellow flesh peach and nectarine cultivars was carried out at the F. Gordon Mitchell Postharvest Laboratory (University of California, Kearney Agricultural Center). Also a survey of the bruising potential (G levels) for different packingline operations was conducted using an accelerometer (IS-100) (TECHMARK, E. Lansing, MI) device.

Results and Discussion

Bruising Potential Survey Average bruising potentials (Gs) varied from 24 to 143 Gs within/between packinghouses (Table 1). In general, the bin dumping and transfer points at the pony sizers, and at the end of the packingline (package filling) had the highest G values. There was a large difference between the three different bin dumpers evaluated. A reading of approximately 175 Gs was detected in two bin dumpers and 107 Gs in the "improved" bin dumper. During dumping, a high value of 220 Gs was measured in standard size bins that were only half full when dumped. Similar values were measured on fruit over the pony sizers. Bruising potentials of 47, 104 and 143 Gs were measured on three types of volume fillers. The highest value corresponded to a hand volume filling operation. Bruising potentials were lower in the tray pack operations surveyed. During dumping with automatic tote or basket dumpers, we measured approximately 60 Gs. Important reductions in these bruising potential values were accomplished by adding padding material to the packingline, minimizing height differences at transfer points, synchronizing timing between components, and reducing the operating speed.

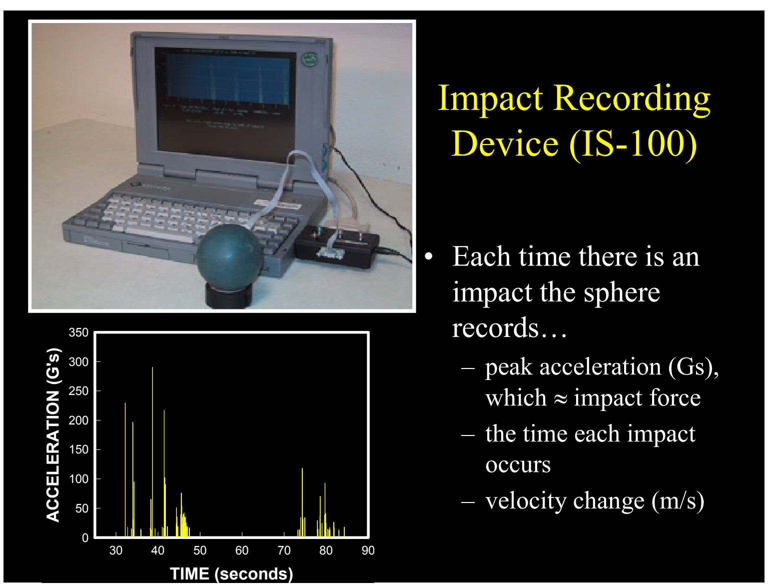
Bruising Susceptibility Critical bruising thresholds were developed for different stone fruit cultivars. The minimum fruit firmness (critical bruising threshold) able to tolerate impact bruising and the number of fruit bruised at a given impact intensity (bruising probability) varied among stone fruit cultivars. Plums tolerated more physical abuse than yellow flesh peach, nectarine and white flesh peach cultivars (Table 2). Plum cultivars started to show bruises when firmness went below 3 pounds. Nectarine and peach cultivars expressed bruises when they softened below 10 pounds and 8 pounds, respectively. The location of the impact on the fruit was an important factor in the calculation of these critical bruising thresholds. In general, soft fruit were more susceptible to impact bruising than hard fruit except in a few peach cultivars in which we found a "safe window" for high impact damage between 6-9 lbf. Among the cultivars evaluated, soft plums tolerated impact damage much better than soft nectarines and peaches.

Recommendations

- CBT can be used as a quantitative tool to decide how late we can pick without inducing bruising, thereby maximizing potential fruit quality.
- Under specific conditions, the comparison of fruit bruising and a given packingline bruising potential will help determine how late fruit can be harvested and packed without causing bruising.
- Our previous work indicated that in most stone fruit cultivars growing under good

light conditions, delaying harvest beyond "California Well Mature" increased fruit size. In some cultivars fruit red color also increased, and in a few, there was the perception of an improvement in flavor. These potential delayed harvest benefits can be improved according to orchard conditions.

Picture 1. Peach showing bruises after harvesting, hauling and packaging operations.



Picture 2. Accelerometer (IS-100) device used to measure impact bruising potential during packing operation.

Table 1. Impacts (Gs) recorded at transfer points of stone fruit packinglines.

Transfer points	Mean[z] (Gs)	S[y]	Range (min-max)
Packinghouse A			
Bin Dumper	90.7	48.6	24-180
Bin Dumper To Pony Sizer	110.4	12.1	105-131
Pony Sizer	70.6	13.3	54-84
To Washer/Brusher	80.0	16.8	75-98
To Sorting Tables	102.0	31.6	66-145
To Sizers	88.9	9.5	74-97
Sizer Cups	67.6	5.3	59-72
Sizer Kick Out	57	21.3	25-78
Boxing Line	71	10.2	55-82
Boxing Machine	65	19.8	46-94
Box Volume Fill	47	24.1	28-89
Box Tray Pack	60.6	18.5	33-78
Packinghouse B			
Bin Dumper	94.3	47.3	38-177
Elevator to Pony Sizer	121.8	50.3	72-187
Pony Sizer to Washer/Brusher	83.4	10.4	71-98
Brusher to Sorting Tables	130.9	29.7	58-180
Sorting to Sizers	94.2	13.7	72-117
Sizer to Sizer Cups	61.0	10.3	38-74
Sizer Cups Kick Out		Not detectable	
Drop Down to Packing Belt	94.9	56.9	30-165
Box Volume Fill	103.8	32.8	70-146
Packinghouse C			
Bin Dumper	82.8	16.5	73-107
Dumper to Elevator	57.9	26.2	25-114
Conveyor to Washer	68.4	21.4	42-106
Washer to Waxer	24.5	4.4	19-33
Waxer to Sorting Tables	25.1	3.5	21-32
Sorting to Sizers	90.6	11.6	72-110
Sizers to Conveyor	71.6	50.8	23-170
Conveyor to Packing Tables	97.5	14.7	83-126
Box Tray Pack	61.5	31.9	27-117
Box Volume Fill	143.0	28.1	111-206

[z] Means were calculated using the peak impact measured during each of the 10 trips of the instrumented sphere across each transfer point.

[y] Indicates standard deviation.

Table 2. Minimum flesh firmness (measured at the weakest point on the fruit) necessary to avoid commercial bruising at three levels of physical handling.

Cultivar	Drop Height[z] (1 cm) ~66 G	Drop Height[z] (5 cm) ~185 G	Drop Height[z] (10 cm) ~246 G	Weakest position
Plums				
Blackamber	0	0	3[z]	Tip
Black Diamond	0	0	0	Suture
Fortune	0	0	0	Shoulder
Royal Diamond	0	0	0	Shoulder
Angeleno	0	0	0	Shoulder
Peaches (yellow flesh)				
Queencrest	0	4	9	Tip
Rich May	0	0	9	Tip
Kern Sun	2	6	9	Tip
Flavorcrest	3	5	6-9	Tip
Rich Lady	6	10	11	Shoulder
Fancy Lady	3	7	11	Shoulder
Diamond Princess	0	0	9	Shoulder
Elegant Lady	3	5	6-9	Shoulder
Summer Lady	0	0	8	Shoulder
O'Henry	3	5	6-9	Shoulder
August Sun	3	4	9	Shoulder
Ryan Sun	0	0	10	Shoulder
September Sun	0	4	9	Shoulder
Nectarines (yellow flesh)				
Mayglo	4	8	11	Tip
Rose Diamond	6	7	8	Suture/Shoulder
Royal Glo	0	9	11	Shoulder/Tip
Spring Bright	6	10	10	Shoulder
Red Diamond	6	7	11	Shoulder
Ruby Diamond	4	9	9	Shoulder
Summer Grand	2	5	6	Shoulder
Flavortop	3	6	6	Tip
Summer Bright	0	6	8	Shoulder
Summer Fire	0	0	9	Shoulder
August Red	2	12	12	Shoulder
September Red	0	0	10	Shoulder

Fruit firmness measured with an 8 mm tip.

[z] Dropped on 1/8" PVC belt. Damaged areas with a diameter equal to or greater than 2.5 mm were measured as bruises.

CAN WE REDUCE POTENTIAL ABRASION INKING DAMAGE DURING THE HARVESTING OPERATION?

C. H. Crisosto, Plant Sciences Department, UC Davis/ Kearney Ag. Center, and Kevin Day, UC Coop. Ext. Tulare County

'Snow Giant' peaches were harvested on August 10, 1996 by using tote and plastic half-bin (~650 lbs) harvesting systems and a field packed system as a control. The field packed system consisted of picking fruit directly from the tree, packing it in boxes with tray packs (18 fruit), and placing the boxes inside half-bins for transportation from the orchard to the loading area. This system was used as a control because it has been demonstrated that transport in tray packs produces less damage. The tote system consisted of picking fruit from the tree and placing them in clean plastic containers (totes); then they were placed inside half-bins and transported to the loading area. The plastic half-bin system is the traditional harvest system in which the fruit is picked from the tree into a harvesting bucket, carefully dumped inside the plastic half-bin and transported to the loading area. All of the fruit utilized in this evaluation were transported from the orchard to the loading area (0.8 miles) on a 4-bin trailer equipped with springs for cushioning. The average speed of the tractor did not exceed 6 mph. The road was well paved and in good condition.

Fruit samples were collected directly from the trees (field packed) and immediately after bin dumping. Fruit samples from the two harvesting systems were collected after arrival at the loading area. To evaluate potential abrasion inking damage at the different steps, four replications of 18 fruit were utilized for each step. The potential abrasion symptoms were considered as inking potential, simulating the case of contamination with iron in the hydrocooler or wash water during brushing. To measure potential abrasion damage the fruit were submerged for one minute in a solution of 100 ppm of $FeCl_3$, then stored for three days at 38°F to permit complete visual expression of the symptoms. The area with symptoms of damage by abrasion was measured with a 10 mm diameter loop (area equivalent to 78.5 mm^2) and the areas were added.

Table 1. Potential abrasion inking damage of 'Snow Giant' peach during the picking operation and hauling within the orchard using the tote and plastic half-bin harvesting systems.

	Potential[y]	
Arrivals	Area (mm^2)	% Culls (area $\geq$ 78.5 mm^2)
Tree	3.4 b	0.0 b
After dumping into half bin	8.9 b	0.4 b
Loading area		
Half bins	47.9 a	20.8 a
Totes	24.0 b	8.4 ab
P-value	0.0069**	0.0480**
LSD 0.05	23.9	16.0

[z] Measured with a 10 mm diameter loop (78.5 mm^2), equivalent to the maximum area allowed for discoloration.

[y] Fruit dipped in 100 ppm $FeCl_3$ solution for 1 min and evaluated after 3 days at 38°F.

Potential abrasion damage and the percent culls were higher in the fruit picked into half-bins and transported to the loading area than the fruit that were tote-picked and transported to the loading area (Table 1). Potential abrasion damage was very low on fruit picked directly from the tree or collected from the bins after dumping. Potential abrasion damage became visible only on fruit samples after their arrival at the loading area. There were no cull problems on fruit sampled before being hauled to the loading area.

CAN WE REDUCE ABRASION INKING DAMAGE DURING TRANSPORTATION TO THE PACKINGHOUSE?

Carlos H. Crisosto, Rodrigo Cifuentes, David Garner, Plant Sciences Department, UC Davis/ Kearney Ag. Center, Parlier

'Snow Giant' peaches were collected on July 29, 1996 using three different harvesting systems: field packed (corrugated box), picked into plastic totes, and picked into plastic half-bins (bulk). The field packed boxes and totes were transported to the packinghouse inside plastic half-bins. Two plastic half-bins were loaded with totes and field packed fruit in the same bin. In bulk fruit bins, a layer of dense foam (4 inches) was placed on the top of the bins to immobilize the fruit in the top layers. These two half-bins were loaded above the rear axle of the truck (worst position), one in the bottom position (1) and the other in the top position (3). On the other side of the truck, the two half-full bins or totes and field packed fruit were loaded in the same positions (1 and 3). Each bin was properly marked for ease of recognition upon arrival to the packinghouse. After harvesting, fruit were transported to the packinghouse by using a 48-foot truck equipped with an air bag suspension system. The truck utilized for this transportation test had a total bin capacity of 72 half-bins (12 half-bins long, 2 half-bins wide, and 3 half-bins high. The cargo capacity was approximately 42,000 lbs. The distance from the orchard to the packinghouse was approximately 70 miles; a trip of approximately one hour and fifteen minutes.

Upon arrival to the packinghouse, samples of fruit were collected for evaluation according to the harvesting system (treatment) and the position of the bins during transportation (subtreatment). To evaluate visual and potential abrasion damage, four replications of 36 fruit were utilized for each subtreatment, except for the field-packed treatment in which 30 fruit per replication were used. Half of the fruit from each replication were used for potential and the other half for visual abrasion damage evaluations. Potential abrasion damage was measured on fruit treated with a solution of 100 ppm $FeCl_3$ for one minute prior to storage. Fruit were placed in storage for four days at 41°F to allow full development of skin discoloration symptoms before evaluation.

There were differences in visual and potential abrasion damage between the different harvesting systems (Table 1). The field packed and tote-picked systems had the lowest visual abrasion damage (none). Under these systems, visual abrasion of 'Snow Giant' peaches was not affected by the position of the bin on the truck. Fruit picked bulk into plastic bins and transported in bulk bins had more visual abrasion damage and culls (approximately 6%) than the other two treatments. However, there were significant differences between treatments for potential skin discoloration disorder (Table 2). Field packed fruit transported in the top or bottom positions had the lowest skin discoloration incidence; totes picked, transported in the bottom position had intermediate skin discoloration damage. However, totes picked and transported in the top position, and bin-picked regardless of transport position had the highest skin discoloration damage.

According to the results, it was observed that the percent of visual culls were low (0-6%) in spite of a transportation distance of 70 miles. This can be explained by the low susceptibility of 'Snow Giant' to abrasion damage, and/or that the entire harvesting and transportation operation was done cautiously. Bruising damage susceptibility can increase rapidly on riper fruit. Totes and plastic half-bins adequately cleaned and in good condition were used during harvesting. The clean half-bins were carefully dumped. The hauling within the orchard was done with trailers equipped with an improved air bag suspension system. The transport distance to the loading point was short (0.8 miles), on a well-paved road and at a speed no greater than 6 mph. Finally, unloading of the trailer was performed with extreme care.

Based on our work, we can suggest that better visual inking reduction during transportation was attained with the field packed and tote-picked systems than with the bin-picked system. However, there was a higher abrasion potential on tote-picked fruit when transported in the top position versus the bottom position (3) on the truck.

Table 1. Visual and potential abrasion inking damage of 'Snow Giant' peach picked using three harvesting systems measured at arrival to the packinghouse.

Treatment	Visual Inking[z] (mm^2)	Visual Culls (%) (area $\geq$ 78.5 mm^2)	Potential Inking[y] (mm^2)	Potential Culls (%) (area $\geq$ 78.5 mm^2)
Harvesting system				
'Field packed'	1.4 b	0.0 b	1.3 c	0.0 c
'Totes'	5.3 b	0.0 b	18.6 b	5.6 b
'Half-bins'	13.4 a	5.6 a	31.0 a	13.2 a
P-value	0.0001**	0.0032**	0.0001**	0.0001**
LSD 0.05	4.2	3.4	6.4	5.0
Bin Position				
Top (3)	6.1	0.9	19.7 a	7.9
Bottom (1)	7.3	2.8	14.2 b	4.6
P-value	0.4774	0.1756	0.0403**	0.1124
LSD 0.05	3.4	2.8	5.2	4.1
Interaction P-value	0.4975	0.1659	0.0043**	0.2006

[z] Measured with a 10-mm diameter loop (78.5 mm^2), equivalent to the maximum area allowed for discoloration.

[y] Fruit dipped in 100 ppm $FeCl_3$ solution for 1 min and evaluated after 4 days at 41°F.

Table 2. Potential abrasion (inking) damage of 'Snow Giant' peach picked using three harvesting systems and measured at arrival to the packinghouse.

Treatments			
Harvesting system	x	Bin position	Inking (mm^2)
'Field packed'	x	Top bin position	0.6
'Field packed'	x	Bottom bin position	2.0
'Totes'	x	Top bin position	28.0
'Totes'	x	Bottom bin position	9.1
'Half-bins'	x	Top bin position	30.4
'Half-bins'	x	Bottom bin position	31.6
P-value			0.0043

PEACH AND NECTARINE CORKING

Kevin R. Day, R. Scott Johnson and Carlos H. Crisosto
University of California

Conditions Favoring Corking

- Cool springs
- High vigor
- Light Crop

2006 Research Results

- External Corking (Picture 1):
  - 12% – summer pruned trees
  - 26% – non-summer pruned trees
- Severe Internal Corking (Picture 2):
  - 2% – summer pruned trees
  - 11% – non-summer pruned trees
  - 1% – low nitrogen trees
  - 5% – high nitrogen trees

Picture 1. External Corking symptoms.

Picture 2. Internal Corking Symptoms.

Recommendations

Of the options that are commonly available to growers, summer pruning offers the greatest potential for reducing corking expression in orchards. In 2006, **heavy** summer pruning approximately 60 days before harvest significantly reduced both external and internal corking (Picture 3). This is drastically earlier than the timing of summer pruning commonly practiced in this area. Presumably, summer pruning reduces the competition between growing shoots and developing fruits, allowing resource(s) to be diverted to fruit.

As such, on those varieties and blocks known to have problems with corking, growers should avoid stimulating excessive vigor. Most importantly, in seasons in which March and April temperatures are significantly cooler than normal, trees should probably be summer pruned sometime in May or early June by significantly reducing the number of total growing points.

Picture 3. Heavy summer pruning (tree on left) approximately 60 days before harvest significantly reduced corking over no summer pruning (tree on right).

Picture 4. Detailed view of heavy summer pruning showing removal of many shoot growth points.

MEASUREMENT OF FRUIT FIRMNESS

D. Garner, C.H. Crisosto, P. Wiley, and G.M. Crisosto

I. Materials:

A. Effegi penetrometer or Magness-Taylor pressure tester, either hand-held or mounted on a stand for consistency.

II. Procedure:

A. Make sure all fruit tested are comparable in temperature since warm fruit are usually softer than cold fruit.

B. Make two puncture tests per fruit, once on each of the opposite cheeks, midway between the stem-end and calyx-end.

C. Remove a disc (about 2 cm in diameter) of the skin with a stainless steel vegetable peeler or sharp knife.

D. Use an appropriate tip (plunger) size for each commodity (5/16" for stone fruit and kiwifruit, D'Anjou pears, Bosc pears, Comice pears, Bartlett pears, and Winter Nellis pears; 7/16" for most apples).

E. All determinations for a given lot should be made by one person to minimize variability.

F. Hold the fruit against a stationary hard surface and force the tip into the fruit at a uniform speed (take 2 seconds).

G. Depth of penetration should be consistent to the inscribed line on the tip.

H. Record reading to the nearest 0.5 lb or 0.25 kg.

1. The unit should be written as poundforce (lbf) or kilogram (kgf) in order to avoid confusion with the units of mass.

III. Maintenance:

A. Before use on a given day, work the plunger in and out about 10 times to loosen up the springs inside the instrument.

B. Clean the tips after use to prevent clogging with fruit juice.

IV. Calibration:

A. Hold the firmness tester in a vertical position and place the tip onto the pan of an accurate scale.

1. Press down slowly on the firmness tester until the scale registers a given weight, then read the firmness tester. Repeat this comparison 3 to 5 times. If you find that the instrument is properly calibrated, it is ready to use.

B. If the instrument reading is not in agreement with the scale reading, find out the magnitude and direction of the difference and proceed as follows:

1. Effegi fruit penetrometer:
   a) Unscrew the chrome guide nut to remove the plunger assembly.
   b) To make the instrument read lower, insert washers between the spring and the stationary brass guide.
   c) To make the instrument read higher, insert washers between the chrome guide nut and the stationary brass guide on the plunger shaft.
   d) Reassemble and recheck for calibration.
2. Magness-Taylor Pressure Tester:
   a) Remove the plunger assembly

from the barrel of the instrument and remove the bolt and washers from the end of the plunger assembly.

b) Pull the plunger and spring out of the metal cylinder, then shake the washers out of the cylinder.

c) To make the instrument read lower, move washers from inside to outside the metal cylinder.

d) To make the instrument read higher, move washers from outside to inside the metal cylinder.

e) Reassemble and recheck for calibration.

C. If the indicator needle does not stop or does not release properly, clean the case in the area of the release button, remove the plunger assembly, and then lubricate the inside of the instrument with an aerosol lubricant.

For purchasing information for penetrometers, check out this website: http://www.qasupplies.com/firtes.html

MOST USEFUL INTERNET SITES FOR POSTHARVEST INFORMATION

Adel Kader, UC Davis

http://postharvest.ucdavis.edu – University of California Postharvest Research and Information Center.

http://www.ba.ars.usda.gov/hb66/index.html – A draft version of the forthcoming revision to USDA Agricultural Handbook 66 (Commercial Storage of Fruits, Vegetables and Florist and Nursery Stocks).

http://www.fao.org/inpho/ – Postharvest information site of the Food and Agriculture Organization of the United Nations.

http://www.avrdc.org/postharvest/index.html – World Vegetable Center Postharvest Information

http://www.uckac.edu/postharv/ – University of California Kearney Agricultural Center (emphasis on stone fruits, kiwifruits, and grapes).

http://www.avocadosource.com – Production and Handling of Avocado Information.

http://postharvest.ifas.ufl.edu – University of Florida Postharvest Group.

http://flcitrus.ifas.ufl.edu – University of Florida Citrus Resources Website

http://www.fdocitrus.com – Florida Department of Citrus postharvest information.

http://postharvest.tfrec.wsu.edu – Washington State University postharvest information (emphasis on apple, pear, and cherry).

http://www.bae.ncsu.edu/programs/extension/publicat/postharv/ – North Carolina State University postharvest information.

http://www.hort.cornell.edu/mcp/ – A summary of published information about effects of 1methylcyclopropene (1-MCP) on fruits, vegetables, and ornamental products.

http://www.chainoflifenetwork.org -A comprehensive information resource about postharvest handling of floral crops.

http://www.postharvest.com.au/ – Sydney Postharvest Laboratory information.

http://www.postharvest.org – Extension Systems International (training in postharvest technology)

http://www.poscosecha.com and **http://www.postharvest.biz** – International Directory of Postharvest Suppliers.

http://www.codexalimentarius.net/web/index_en.jsp – FAO-WHO Food Standards.

http://www.ams.usda.gov – U.S. Department of Agriculture, Agricultural Marketing Service information on quality standards, transportation, and marketing.

http://useu.usmission.gov/agri/Fruit-Veg.html – European Union Marketing Standards for Fruit and Vegetables.

http://www.mrldatabase.com/ – International Maximum Residue Limit Database (Pesticide residue information).

http://www.codexalimentarius.net/mrls/pestdes/jsp/pest_q-e.jsp – Pesticide Residues in Food.

http://www.fao.org/ag/agn/jecfa-additives/search.html?lang=en - FAO-WHO Combined Compendium of Food Additive Specifications.

http://www.ams.usda.gov/nop/ – National organic program standards.

http://www.aphis.usda.gov/ppq/manuals/pdf_files/Treatment_Chapters.htm – U.S. Department of Agriculture, Animal and Plant Health Inspection Service information on phytosanitary and quarantine requirements.

http://www.nutrition.gov – Gateway to U.S. government information on human nutrition and nutritive value of foods.

http://www.mypyramid.gov – USDA interactive website about application of the 2005 Dietary Guidelines to individual consumers.

http://www.ars.usda.gov/ba/bhnrc/ndl – Composition of foods.

http://www.fruitsandveggiesmorematters.org – Produce for Better Health Foundation's promotion of produce consumption.

http://www.fruitsandveggiesmatter.gov – U.S. government (CDC, DHHS, NCI) site for promotion of produce consumption.

http://www.fightbac.org – Partnership for Food Safety Education

http://www.foodsafety.gov – Gateway to U.S. government information on food safety.

http://www.jifsan.umd.edu/gaps.html – U.S. Food and Drug Administration's Manual of "Improving the Safety and Quality of Fresh Fruits and Vegetables."

http://www.ucfoodsafety.ucdavis.edu – University of California's food safety information.

http://ucgaps.ucdavis.edu – University of California's Good Agricultural Practices.

https://wifss.ucdavis.edu/about.html – Western Institute for Food Safety and Security (WIFSS).

http://www.cfsan.fda.gov/~dms/secguid6.html – Food security guidance documents.

http://www.eurep.org/Languages/English/index_html – Global Partnership for Safe and Sustainable Agriculture, EUREP GAP.

If you know of another Internet site that should be added to this list, please let me know.

–Adel Kader (aakader@ucdavis.edu)

FUTURE DATES

2007 Variety Displays and Research Update Seminars at the Kearney Agricultural Center, 9240 S. Riverbend Avenue, Parlier, CA. Sponsored by University of California Cooperative Extension and the Kearney Agricultural Center.

8:00 – 9:00 a.m.	Variety display by stone fruit nurseries, breeders and the USDA
9:00 – 10:00 a.m.	Research Update Topic and discussion in the field

Mark your calendars for these dates:

- Friday, July 13 TBA
- Friday, August 10 Preventing fruit doubles, deep sutures and other disorders

For more information contact: Scott Johnson (559) 646-6547 or sjohnson@uckac.edu; Kevin Day (559) 685-3309, Ext. 211 or krday@ucdavis.edu; Harry Andris (559) 456-7557 or hlandris@ucdavis.edu; Brent Holtz (559) 675-7879, Ext. 209 or baholtz@ucdavis.edu; or Bob Beede (559) 582-3211, Ext. 2737 or bbeede@ucdavis.edu.

Upcoming events are posted on the Postharvest Calendar at the ANR website at:
http://ucce.ucdavis.edu/calendar/calmain.cfm?calowner=5423&group=w5423&keyword=&ranger=3650&calcat=0&specific=&waste=yes

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Current and previous issues of the **Central Valley Postharvest Newsletter** can always be found on our website at www.uckac.edu/postharv. If you wish to subscribe and receive a mailed copy, please fill out and mail the form below with payment. If you wish to receive an electronic mail notice with PDF attachment when a new issue is published, please provide your email address to lois@uckac.edu and put CVPN in the subject line.

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Country: ____________________ Email: